REMARKS

Favorable reconsideration of this application is respectfully requested in view of the following remarks.

The withdrawal of the rejections set forth in the earlier Official Action are noted with appreciation. The most recent Official Action sets forth several new rejections. Before discussing those rejections, a brief overview of the subject matter at issue here is set forth.

As summarized in the prior response, the claims currently under consideration define a bent glass sheet tempering apparatus that includes means for conveying the bent glass sheet along a predetermined path, and a pair of blastheads that quench the bent glass sheet with jets of quench gas. The blastheads include upper and lower blastheads 20, 21 positioned in opposing relation to each other above and below the predetermined path. Each of the blastheads comprises a plurality of spaced elongate plenums 22 best illustrated in Figs. 2a and 3. As discussed near the top of page 10 of the present application, each plenum includes a row of quench nozzles 23 or two rows of quench nozzles. The quench nozzles are configured so that their length exceeds their diameter. The quench nozzles of each plenum are mutually inclined to provide diverging jets of quench gas, and the plenums extend transversely to the direction of conveyance of the bent glass sheet to afford side access between adjacent pairs of plenums. In addition, each array of quench nozzles is curved in at least one direction.

One of the documents cited relative to the bent glass sheet tempering apparatus recited in Claim 1 is U.S. Patent No. 4,711,655 to Schultz. This reference discloses a quenching apparatus for cooling hot glass sheets. The focus of the

disclosure in this document is a flexible and adjustable quenching apparatus. The quench assembly includes a duct 64 supplying cooling air to a bottom plenum 60 which directs the cooled air to flexible subassemblies 62. The flexible subassemblies 62 include a nozzle box 66 and a flexible nozzle assembly 68. The flexible nozzle assembly 68 provides a plurality of nozzles 104 and is connected to a drive mechanism 190 by way of a linkage assembly 160. This allows the radius of curvature of the nozzle assembly 68 to be varied or adjusted.

One difference between the bent glass sheet tempering apparatus at issue here and the disclosure in Schultz is that the nozzles in the apparatus at issue here are specifically arranged to contribute to providing a more efficient quench apparatus that allows thinner glass sheets to be tempered relatively efficiently, despite the inherent difficulty associated with tempering thinner sheets. As discussed at various places in the present application (e.g., the bottom half of page two of the present application, the bottom portion of page eight of the present application, and the top portion of page ten of the present application), it is desirable to disperse spent quench gas as quickly as possible for purposes of improving heat transfer from the glass sheet to be quenched. An important measure in this regard is to maximize the number and size of passages available through which spent quench gas can exit the apparatus. However, it is also necessary to supply the quench gas to the glass sheet in the first instance. This thus creates a conflict between the amount of space occupied by the plenums through which the quench gas is supplied and the amount of empty space between pairs of plenums through which the spent quench gas exits the apparatus. In the bent glass sheet tempering apparatus at issue here, the number of rows of quench nozzles per plenum is one or two, as discussed at the top

of page ten of the present application and as now recited in Claim 1. This thus allows the plenums to be kept relatively slim considered with reference to the direction of glass sheet conveyance. This in turn results in an increased number of exhaust passages between pairs of plenums since there is an increased number of plenums. It is thus possible for spent quench gas to exit the apparatus relatively directly and rapidly because the gas does not have to travel so far sideways to find its way into the nearest exhaust passage.

As noted, independent Claim 1 is amended to recite that each of the plenums bears one or two rows of quench nozzles, an arrangement discussed in lines 3-7 on page ten of the present application. Also, the claim wording is clarified to make clear that the successive rows constitute the array of quench nozzles. This is discussed in lines 28-30 on page ten of the application. In the context of the language in Claim 1 defining the plenums and the one row or two rows of quench nozzles, the disclosure in Schultz is quite different. Referring to Fig. 6 of Schultz, and the discussion in lines 11-13 of column 6, Schultz discloses either 5 or 21 rows of nozzles per plenum, depending upon the direction in which one considers Schultz's rows to extend. In the apparatus at issue here, the rows of nozzles extend in the direction of elongation of the plenums. In Schultz, the illustration in Fig. 6 and the discussion in lines 11-13 of column 6 make clear that Schultz considers the rows to extend at right angles to the direction of elongation of the plenum.

The language in Claim 1 of the present application refers to a plenum, which corresponds to the nozzle box 66 disclosed in Schultz. The features referenced as plenums 60, 214 in Schultz are actually large ducts which supply the nozzle boxes 66 with air. Considering the Claim 1 language referring to the row, Schultz's "row"

would have 21 nozzles as can be seen from Figs. 3 and 4 of Schultz. However, even if one were to consider the orthogonal direction, the "row" would each have 5 nozzles.

As mentioned above, the apparatus at issue here seeks to provide a more efficient quench apparatus which allows thinner glass sheets to be tempered more efficiently. For at least this reason, each plenum of the apparatus bears one or two rows of quench nozzles, with successive such rows constituting the array of quench nozzles. There would have been no reason for one skilled in the art to modify Schultz to arrive at the apparatus recited in Claim 1 for a number of reasons.

The disclosure in Schultz relates to a timeframe (1986) in which automotive glass possessed curvature in only one direction. This is evident from a comparison of Figs. 2 and 3 in Schultz; Fig. 3 shows the glass sheet G as curved whereas Fig. 2 shows the glass sheet to be flat. The flexible nozzle assembly 68 which is the focus of the Schultz disclosure is only able to adjust in one direction and was thus no longer relevant at the time the apparatus at issue here was developed. This is because of the current day emphasis on glass curved in multiple directions. With an emphasis on improved fuel efficiency, the thickness and thus the weight of glass in automobiles has been reduced and so an apparatus from the 1980s such as disclosed in Schultz is simply not sufficiently efficient to temper the thin glass of the 21st century. The sealing arrangements disclosed in Schultz involving the overlapping covers 116, 118 and the multiple side walls 94, 96, 98, 100, 130, 132, 134 and pockets 102, could not accommodate the higher pressure quench air used nowadays and would lead to wasteful linkage. There is simply no discussion or other indication in Schultz, or any other applied reference, that the number of rows of

nozzles per nozzle box ("plenum" in the language of Claim 1) could or should be reduced from the 5/21 illustrated in Schultz to the one or two rows as claimed. Doing so would significantly decrease the efficiency of the apparatus.

It is thus respectfully submitted that the claimed bent glass tempering apparatus recited in Claim 1 is patentably distinguishable over the disclosure in Schultz.

The other reference cited in the Official Action is U.S. Patent No. 5,507,852 to Frank et al. This patent discloses an apparatus for quenching glass sheets. The quench 44 is constructed to eliminate the common plenum oftentimes positioned beneath the nozzles and to instead provide two chambers 48, 50 supplying air through openings 51 in the chambers 48, 50 to opposite ends of spaced apart nozzle assemblies 52. The nozzle assemblies 52 include an air supply conduit 55 connected to the chambers 48, 50 and a nozzle bar 57 provided with holes directing cooling air to the glass sheet G.

The focus of the disclosure in Frank et al. is constructing the quench apparatus to allow glass to be unloaded from the line without adversely affecting the serial passage of glass sheets in the event an operating problem occurs. For this purpose, the quench apparatus includes a hopper 46 forming a collector for collecting broken or otherwise defective glass sheets.

The Official Action takes the position that independent Claim 1 and several dependent claims are anticipated by the disclosure in Frank. However, the bent glass sheet tempering apparatus recited in Claim 1 includes the spaced elongate plenums that supply quench gas to an array of quench nozzles, wherein the length of

the quench nozzles exceeds the diameter of the quench nozzles. Frank et al. lacks disclosure of such nozzles.

The discussion in lines 51-59 of column 3 of Frank et al. merely describes that each of the nozzle bars 57 includes holes, and that the nozzle bars can be replaced with individual nozzles. There is simply no disclosure of nozzles configured in the manner recited in Claim 1.

Accordingly, the anticipatory rejection of the bent glass sheet tempering apparatus recited in Claim 1 based on the disclosure in Frank et al. is not appropriate and should be withdrawn.

The dependent claims define additional distinguishing aspects associated with the claimed tempering apparatus at issue here. As these dependent claims depend from allowable independent Claim 1, a detailed discussion of the additional distinguishing features recited in each dependent claim is not required. However, several comments about new dependent Claim 20 are warranted.

New dependent Claim 20 recites that alternating ones of the nozzles along each nozzle bar are inclined in opposite directions. This is discussed in lines 20-29 of page 12 of the present application. The discussion in the paragraph bridging pages 12 and 13 of the present application point out that this arrangement produces jets of quench air in a so-called "domino 5" pattern. This is desirable because it produces a relatively optimized fracture pattern. This differs from the pattern produced by Schultz et al. This arrangement considered together with the features recited in Claim 1 produces the desired pattern while minimizing the number of plenums. Thus, the arrangement set forth in Claim 20 has the effect of generating jets of quenched gas diverging alternately, so that the jets impinge on the glass

sheet in two separate rows. The practical effect of this is to generate two rows of jets from each nozzle bar, thus halving the number of nozzle bars, and hence plenums, compared with generating only one row of jets from each nozzle bar. Once again, this is consistent with the discussion near the top portion of page ten of the application describing the desire to minimize the space occupied by the plenums to allow more space for dispersal of spent quench gas.

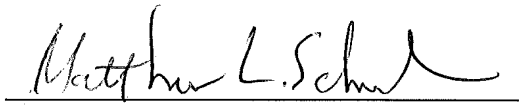
It is thus respectfully submitted that dependent Claim 20 is further allowable.

Early and favorable consideration of this application is respectfully requested

Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: October 28, 2009 By: 

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